AEROSPACE ENGINEERING

PNRR/CNMS - Development of shape sensing and Structural Health Monitoring approaches for aerospace Digital Twin applications

Funded By	Ministero dell'Università e della Ricerca - MUR [P.iva/CF:96446770586] Politecnico di TORINO [P.iva/CF:00518460019]

Supervisor	GHERLONE MARCO - marco.gherlone@polito.it

Contact	GHERLONE MARCO - marco.gherlone@polito.it

Context of the research activity	The research activities deal with the scientific and technological areas related to the Spoke 1 – Air Mobility within the framework of the National Center for Sustainable Mobility, funded by the National Recovery and Resilience Plan - NextGenerationEU (PNRR 2022-2025). The activities will fall within the remits of the Work Package WP 7-T "Digital twins and threads: a new paradigm for aircraft design and maintenance with demonstrator". In particular, the aim is to formulate, implement and assess shape sensing and Structural Health Monitoring techniques that can be integrated in the development of Digital Twins for aerospace applications. Progetto finanziato nell'ambito del PNRR - PNRR M4C2, Investimento 1.4 - Avviso n. 3138 del 16/12/2021 - CN00000023 Sustainable Mobility Center (Centro Nazionale per la Mobilità Sostenibile) – CNMS - CUP E13C22000980001

Objectives	The research activity will investigate methodologies that, starting from discrete data (strains, accelerations, etc.) coming from sensors located on the aircraft structures: • are able to reconstruct the displacement, strain and stress field • allow the application of Structural Health Monitoring approaches (damage identification, damage detection) • contribute to the development of a Digital Twin of the monitored aircraft The focus will also be on: • the sensing system: sensors technology, sensors-structure integration (attached/embedded), optimal sensors configuration, virtual sensors approaches • the effect of uncertainties/measurement noise The developed methodologies will be assessed both numerically (by using

	high-fidelity FE model of the monitored structures) and experimentally (on reduced-scale prototypes).

Skills and competencies for the development of the activity	Structural analysis, Finite Element Method, Shape Sensing methodologies